

NOTES ON THE FLORA OF COSTA RICA, 3:

NEW SPECIES IN THE MORACEAE

William C. Burger
Field Museum of Natural History, Chicago, Illinois

The Moraceae are rather common components of tropical evergreen forest formations and yet they are very poorly represented in herbaria. One reason for this is the small inflorescences usually lacking bright colors and thus very difficult to see among the foliage. Another reason appears to be the short flowering period of some species. In the case of many species of Ficus and Coussapoa plants may begin as high epiphytes and the likelihood of finding small trees with flowers or fruit within reach is much less than with trees that begin growing on the ground. The Flora of Panama (DeWolf in Woodson & Schery 1960) listed 19 species of Ficus but the new Flora Costaricensis will have twice as many. This is partly due to a narrower delimitation of species but a more important factor is our improved sampling of these large and often epiphytic trees. The program of general collecting in Costa Rica initiated by Louis Williams and carried out by Alfonso Jimenez, Roy Lent, and others, the work of Leslie Holdridge, and intensive study of the tree and shrub floras of selected sites by Gary Hartshorn and Paul Opler have greatly improved our knowledge of Costa Rica's woody flora in recent years. Thus all of the newly described species are represented by more than one collection. In addition to the new species described here, the flora will contain a number of species new to Costa Rica and tentatively placed under species described and previously only known from other areas.

New species are here described in the genera Coussapoa, Ficus, Pourouma, and Trophis. All of these new species will be illustrated in the forthcoming flora. The genera Coussapoa and Pourouma belong to the subfamily Conocephaloideae and these plants are more closely related to genera of the Urticaceae than they are to genera of Moraceae according to Corner (1962). I agree with Corner but because of the use of our floras as reference works I will retain the genera of the Conocephaloideae (Cecropia, Coussapoa, and Pourouma) in the Moraceae where most users will look for them.

My experience with regard to Ficus is very different from that of DeWolf (1969) who has seen only one new species collected in recent years. The genus is very poorly sampled for reasons mentioned earlier and one often finds relatively common species represented by only a few collections in herbaria. Under these conditions it is not surprising that recent work has produced material that appears to represent taxa not previously described.

COUSSAPOA GLABERRIMA W. Burger, sp. nov.

Arbores parvae, internodiis foliiferis 2-5 mm crassis; stipulis 8-23 mm longis, 3-4 mm crassis, glabris. Folia glabra, petiolis 6-15 (20) mm longis, 1-2.5 mm crassis; laminae 7-14 cm longis, 2.3-6 cm latis, obovatis, anguste ellipticus, vel oblanceolatis, apicibus acutis vel obtusis, basibus cuneatis vel obtusis, nervis secundariis 2 vel 3 utrinque. Inflorescentiae masculinae ignotae. Inflorescentiae femineae geminae, capitulis 2 vel 3 pedunculo communi, pedunculis capitulorum 5-15 mm longis, glabris, capitulis femineis 6-14 mm diametro, globosis, cum 14-40 floribus. Fructus 2-2.5 mm longi, 1.3 mm lati. HOLOTYPUS: Proctor, Jones, & Facey 27080 in F (1640750), ISOTYPI: US, NY.

Small trees, independent or epiphytic, with watery sap, leafy internodes 4-15 mm long, 2-5 mm thick, essentially glabrous; stipules 8-23 mm long, 3-4 mm thick at the base, glabrous and drying dark brown. Leaves rather uniform and not usually clustered at the ends of branches, petioles 6-15 (20) mm long, 1-2.5 mm thick, glabrous and drying dark, flattened or sulcate above, petiolar tissue often extending 1-4 mm down the stem at the base; laminae 7-14 cm long, 2.3-6 cm broad, obovate to narrowly elliptic or oblanceolate, obtuse to acute at the apex, cuneate to obtuse at the base, entire, the laminae drying very stiffly chartaceous to subcoriaceous, smooth and glabrous on both surfaces, often dark above (dry), venation subpalmate, the 2 or 3 pairs of major secondary veins not loop-connected, basal secondaries arising from the petiole and parallel with the primary vein for 0-10 mm viewed from above or apparently united when viewed from below, pockets sometimes present at the juncture of the basal secondaries with the primary vein, central secondaries arising at angles of 15-30 degrees, tertiary veins slightly raised beneath. Male inflorescences and flowers unknown. Female inflorescences of 2 or 3 capitula on a common peduncle 2-4 cm long, about 1-1.4 mm thick, glabrous, peduncles of the capitula 5-15 mm long, female capitula 6-14 mm in diameter, globose, each with about 14 to 40 flowers. Fruit 2-2.5 mm long, about 1.3 mm broad, abruptly rounded at both ends, slightly flattened longitudinally.

This species is known from only two collections, both from lowland rain-forest formations: A. Jimenez 3016, 8 km. south of Rincón, Peninsula de Osa (Puntarenas) in Costa Rica and the type from near Cerro San Isidro, Río Kama, Río Escondido (Blue-fields) in Nicaragua, flowering on the 28th of February and the 10th of March, respectively.

Coussapoa glaberrima is distinguished by its relatively small narrow leaves with few secondary veins and its glabrous parts. This species appears to be related to C. parviceps Standley among our species but differs in the narrower leaves with fewer veins, more compact inflorescences, and lower altitude habitat. Because these plants are so rarely collected the species of the genus and their interrelationships are very poorly understood.

FICUS BREVIBRACTEATA W. Burger, sp. nov.

Arbores 8-18 m altae, internodis foliiferis 0.5-2.5 cm longis, 5-12 mm crassis, parce puberulis; stipulis 7-12 mm longis, 6 mm crassis prope basem, dense sericeis. Folia petiolis 1.4-8.2 cm longis, 1.5-4 mm crassis; laminis 12-28 cm longis, 5-12 cm latis, oblongo-ellipticis vel obovatis, apicibus breve acuminatis, pagina supra glabrata, nervis secundariis 6-9 utrinque. Receptacula geminata sessilia, oblata vel subglobosa, 10-15 mm diametro, pagina glabrata vel puberula prope basem, bracteis basilaribus 1-2 mm longis, sericeis. HOLOTYPUS: Lent, Burger, & Gentry 3441 in F, (1720583), ISOTYPI: BM, CR, MEXU, US.

Trees 8-18 m tall, leafy internodes 0.5-2.5 cm long, 5-12 mm thick, sparsely puberulent with thin yellowish or grayish hairs about 1 mm long, often becoming glabrous, smooth and gray, with few prominent angular ridges on drying; stipules 7-12 mm long, about 6 mm broad at the base, densely sericeous with thin pale grayish ascending hairs. Leaves often confined to the ends of twigs, petioles 1.4-8.2 cm long, 1.5-4 mm thick, with scattered thin hairs 0.8-1.5 mm long or glabrous, periderm often peeling off in small flakes; laminae 12-28 cm long, 5-12 cm broad, elliptic-oblong to obovate, usually broadest at or above the middle, abruptly narrowed at the short-acuminate apex, obtuse or rounded and occasionally cordulate at the petiole, margin entire or occasionally slightly rounded-crenate distally, the laminae drying stiff-chartaceous to subcoriaceous, smooth and glabrous above, glabrous or with slender ascending hairs on the midvein beneath, the 6 to 9 pairs of major secondary veins arising at angles of 30-60 degrees, loop-connected and forming a submarginal vein only near the apex, the basal secondaries

often differing from those above and arising at a smaller angle. Figs usually paired at a node, sessile, the basal bracts difficult to see, 1-2 mm long and equally broad, pale grayish sericeous; the fig 10-15 mm in diameter (dry), slightly flattened above and below, subglobose to oblate, glabrous or with a few thin hairs near the base, smooth and drying dark, often with a few pale spots, the ostiole within a slightly elevated circle of tissue 2.5-4 mm broad; seeds and galls about 1 mm long.

Plants of the very wet evergreen forest formations of the Caribbean slopes between 100 and 800 m elevation; fertile collections have been made in December, January, and April. This species is known only from between the area of Volcán Arenal (Alajuela) and the basin of the Río Pacuare (Cartago) in Costa Rica.

Ficus brevibracteata is recognized by the unusual stems, the short stipules broad at the base and covered with long pale grayish hairs, laminae often on long petioles and broadest above the middle, the sessile figs subtended by very small bracts, and the ostiole only very slightly elevated. The paired figs and distally brown oblongoid-capitate microscopic hairs (150X) on the lower leaf surface are characteristics of the subgenus Urostigma. This species is closely related to F. trigonata L. and F. morazaniana Burger but those usually have pedunculate figs and the leaves are quite different. This species is known from below Volcán Arenal (the type), near the Río Sarapiquí (Hartshorn 989 and Walters 32), near the Río Puerto Viejo (Burger & Matta 4205 and Hartshorn 1099), and near Turrialba (GMV 640, Museo Nacional #40467). A number of sterile collections with somewhat thicker leaves with the major veins broadly impressed to give the laminae a corrugated appearance are probably this species and were collected near Taus (Lent 2536 & 2752) and Valle Escondido (Walter 77) in the province of Cartago. A collection (Molina 7175) from the Valle Jamalteca, Dept. Comayagua, Honduras, with smaller figs is probably this species. All these collections are from between 100 and 800 m elevation.

FICUS CRASSIVENOSA W. Burger, sp. nov.

Arbores, internodiis foliiferis 1-35 mm longis, 2-6 mm crassis, glabris vel minute puberulis; stipulis 2-3 cm longis, glabris. Folia petiolis 8-24 mm longis, 2-4 mm crassis, plerumque glabris, sulcatis; laminis 5.5-13 cm longis, 2-7 cm latis, obovatis, ellipticis, vel oblongis, apicibus rotundatis vel obtusis, pagina supra et pagina inferna glabra, nervis secundariis 10-40 utrinque, crassis. Receptacula solitaria,

pedunculis 6-8 mm longis, 1-1.5 mm crassis, glabris, globosa sed basi attenuata, circa 15 mm diametro, ostiolis conicis, bracteis basilaribus 3, 1-2 mm longis, 2-3 mm latis, minute puberulis. HOLOTYPUS: Hartshorn 1238 in F (1721187), ISOTYPUS: CR.

Trees to over 30 m tall or occasionally epiphytic, leafy internodes 1-35 mm long, 2-6 mm thick, glabrous or sparsely and very minutely puberulent, the epidermis occasionally reddish-brown and flaking off in long (5 mm) strips, the periderm becoming deeply ridged and striate when dry, twigs grayish in age; stipules 2-3 cm long, about 2-4 mm thick at the base unopened, glabrous. Leaves separate or clustered at the ends of branchlets, petioles 8-24 mm long, 1-3 mm thick, usually glabrous, sulcate above; laminae 5.5-13 cm long, (2) 3-7 cm broad, obovate to elliptic or elliptic-oblong, rounded to obtuse and with a blunt tip at the apex, obtuse at the base, drying subcoriaceous and the margins slightly revolute, smooth and glabrous (10X) above and below, often lustrous above, the 10 to 40 pairs of major secondary veins often difficult to distinguish from the intermediate veins, raised on both surfaces, appearing thickened above, the central secondaries arising at angles of 60-90 degrees, the secondaries connected by a submarginal vein 1-2 mm from the margin, tertiary veins slightly raised on both surfaces. Figs solitary at a node, borne on peduncles 6-8 mm long, 1-1.5 mm thick, glabrous, basal bracts 1-2 mm long and 2-3 mm broad, sparsely and minutely puberulent, deciduous, the fig narrowed beneath to form a stalk-like portion 1-3 mm long above the 3 bracts, expanded portion of the fig globose, about 15 mm in diameter, surface smooth and glabrous or with a few minute (0.05 mm) hairs, ostiole conical, wall of the fig about 1 mm thick (dry). Seeds and galls 1.5-2 mm long.

Very tall trees or (?) epiphytes in the very wet forests of the Caribbean slopes and lowlands between about 60 and 600 m elevation. The species is known from only three collections: the type from near La Selva on the Río Puerto Viejo and Burger & Burger 8134 from Tirimbina near the Río Sarapiquí, Heredia, and Walters 79 from Valle Escondida, Cartago.

The characteristic microscopic oblongoid-capitate trichomes (150X) on the lower leaf surfaces and the solitary figs with 3 bracts are characteristics of the subgenus Pharmacocyce. The thick leaves with many secondary veins and a submarginal vein near the edge are similar to the leaves of F. crassiuscula Warburg ex Standley, but the tertiary veins are more pronounced and the laminae more blunt in this species. The lowland habitat and small stipules and figs are also very different from those of F. crassiuscula. The figs of this species are very similar

to those of *F. yoponensis* Desv. but that species has very different foliage. This species was only known from two sterile twigs until Gary Hartshorn collected material with figs on 29 May 1973.

FICUS LATERISYCE W. Burger, sp. nov.

Arbores circa 10 m altae, internodis foliiferis 4-12 (16) mm longis, 2-6 mm crassis, plerumque glabris; stipulis (5) 8-18 mm longis, 4 mm crassis prope basin, glabris vel minute puberulis. Folia petiolis 1.2-3.6 cm longis, circa 2 mm crassis, glabris vel minute puberulis; laminis 4.5-11 cm longis, 2.5-6 cm latis, ellipticis, oblongo-ellipticis, vel aliquantum obovatis, apicibus acutis vel breve acuminatis, pagina supra et pagina infera glabra, nervis secundariis 5-9 utrinque. Receptacula geminata, sessilia, affixa ad latus, oblata, 6-8 mm diametro, pagina glabra, bracteis basilaribus 3-4 mm longis et portatis e basi disciformi, glabratis vel minute puberulis. HOLOTYPUS: Lent 2972 in F (1720605), ISOTYPI: CR, MEXU, US.

Medium sized (10 m) trees, often stranglers, leafy internodes 4-12 (16) mm long, 2-6 mm thick, essentially glabrous, becoming grayish and longitudinally striate with shelves formed beneath the sessile figs; stipules (5) 8-18 mm long, about 4 mm broad at the base, glabrous or very minutely (0.05-0.1 mm) puberulent throughout. Leaves often clustered near the ends of branches, petioles 1.2-3.6 cm long, about 2 mm thick, glabrous or very minutely puberulent, longitudinally striate when dry and sulcate above; laminae 4.5-11 cm long, 2.5-6 cm broad, elliptic to elliptic-oblong or slightly obovate, acute or very short acuminate at the apex, acute to obtuse (rarely rounded) at the base, entire, the laminae drying stiffly chartaceous, smooth and glabrous on both surfaces, the 5 to 9 pairs of major secondary veins arising at angles of 30-60 degrees, weakly loop-connected near the margin, flat on both surfaces and often somewhat obscure beneath. Figs usually paired at a node, sessile and leaving shelves on the branchlets, usually attached on the side with respect to the ostiole, basal bracts arising from the edge of a broad disc-like area about 5 mm broad beneath, attachment of the fig at the edge of this often pusticulate disc-like area, bracts about 3-4 mm long (measured from the edge of the disc) and 5 mm broad, glabrous or very minutely (0.05-0.1 mm) puberulent; the fig 6-8 mm in diameter (larger at maturity?), flattened above and below and occasionally on one side but usually oblate, the surface smooth and glabrous, ostioles 2-2.5 mm broad, very slightly conical, lustrous brown, with usually only 2 exterior scales; seeds and galls about 0.7-1.3 mm long.

The species is only known from the wet Caribbean slopes between Cariblanco and San Miguel de Sarapiquí (Burger, Gentry, & Hartshorn 9090), Alajuela, and near Taus (Lent 2537, 2972, & 2983), Cartago. All of these collections were made near an altitude of 750 meters with figs in pre-fruiting stages in October, April, and May.

Ficus laterisyce is distinguished by the glabrous or very minutely puberulent parts, small laminae on prominent petioles, sessile figs attached at the side and leaving prominent shelves in the branchlets, and the relatively large bracts arising from the edge of a disc-like area beneath the fig. The paired figs, strangling habit, and few exterior scales on the ostiole are characteristics of the subgenus Urostigma. The figs of this species are very similar to those of F. isophlebia Standley in the development of the disc-like base and lateral attachment but the leaves are quite different. This species also resembles F. davidsoniae Standley which has much more coriaceous leaves with many more secondary veins and the figs not usually laterally attached.

FICUS MORAZANIANA W. Burger, sp. nov. F. lapathifolia auctores not F. lapathifolia (Liebm.) Miq.

Arbores 5-25 m altae, internodis foliiferis 8-65 mm longis, 4-12 mm crassis; stipulis 12-30 mm longis, puberulis. Folia petiolis 12-40 mm longis, 2-4 mm crassis, hirsutis; laminis 10-30 cm longis, 5-15 cm latis, obovatis vel oblongo-ellipticis, apicibus rotundatis vel obtusis, pagina supra minute hirsuta, pagina inferna dense hirsuta cum pilis fuscis 0.3-1 mm longis, nervis secundariis 9-14 utrinque. Receptacula geminata, pedunculis 4-8 mm longis, 1.5-3 mm crassis, globosa vel obovoidea, 12-19 mm diametro, pagina minute tomentulosa, bracteis basilaribus 2-4 mm longis. HOLOTYPUS: Standley 76312, in F (1103833), ISOTYPUS: US, collected near Jutiapa, alt. about 850 m, in Guatemala and called amate cusho. (The isotype has a different label with the altitude as 1360 m.)

Trees 5-25 m tall, trunk often fluted or grown together stems, usually seen as independent trees but often beginning as epiphytes or stranglers, leafy internodes 8-65 mm long, 4-12 mm thick, sparsely to densely puberulent with erect slender hairs about 0.5 mm long, periderm becoming glabrous, smooth and longitudinally deeply ridged (dry); stipules 12-30 mm long, 5-9 mm thick at the base unopened, with minute (0.05 mm) or larger (0.5 mm) ascending hairs. Leaves clustered or distant, petioles 12-40 mm long, 2-4 mm thick, densely hirsute with brownish hairs 0.3-1 mm long, terete to narrowly sulcate above and longitudinal-

ly striate on drying; laminae 10-29 (33) cm long, 5-13 (16.5) cm broad, obovate to oblong or broadly elliptic, abruptly rounded or occasionally obtuse at the apex, obtuse to rounded at the base and often slightly cordulate at the petiole, drying very stiffly chartaceous and the margins slightly revolute, smooth but minutely hirsute above, densely hirsute beneath with slender pale brownish hairs 0.3-1 mm long, the 9 to 14 pairs of major secondary veins flat above and prominent beneath, central secondaries arising at angles of 50-80 degrees, secondaries weakly loop-connected near the margin and a submarginal vein usually absent, tertiary veins readily evident beneath. Figs usually paired at a node, borne on peduncles 4-8 mm long, 1.5-3 mm thick, hirsute with ascending yellowish hairs about 0.7 mm long, bracts 2, usually entire, about 2-4 mm long and 5 mm broad, minutely puberulent, a disc-like thickening at the base of the bracts usually absent or poorly developed (sometimes present); figs 12-19 mm in diameter, 16-20 mm long, globose to somewhat obovoid, the surface densely pale tomentulous with hairs 0.05-0.5 mm long, ostiole conical in early stages but becoming surrounded by a ring of thickened tissue 2-3 mm broad, often elevated above the surface of the fig; seeds and galls 1-1.5 mm long.

Trees of the seasonally dry deciduous and evergreen forest formations from sea level to about 1100 m elevation on the Pacific slopes of Costa Rica and more rarely on the wet Caribbean slopes; mature figs have been collected between November and March. This species ranges from southern Mexico to Central Costa Rica, mostly along the Pacific slopes.

Ficus morazaniana is recognized by its puberulent leaves and stems, pedicellate figs with densely puberulent surface and rather small bracts and its apparent preference for seasonally dry habitats. This species is very closely related to F. trigonata L. but differs in the slightly larger and more puberulent figs, more puberulent laminae with a greater number of secondary veins, and different habitat and range. This species is a member of the subgenus Urostigma but the plants have been incorrectly placed under the name F. lapathifolia (Liebm.) Miq. which is a Mexican species belonging to the subgenus Pharmacosyce (Gomez-Pompa 1966). Standley (1917) also ascribed the name F. guatemalana (Miq.) Miq. to this species which was described from plants grown at Berlin from seed said to have been collected in Guatemala by Warszewicz. Since this material was sterile and has probably been destroyed I consider F. guatemalana a nomen dubium. It seemed appropriate to name this species, which ranges through the republics of Central America, in honor of Francisco Morazán, who fought for Central American union over a century ago.

There are collections from the Yucatan peninsula and from a few areas of Central America that lack the dense pubescence typical of F. morazaniana and these resemble F. trigonata. There are insufficient collections at present to determine whether these are local variants or whether they represent intermediates between what are here considered to be two different species. Ficus morazaniana can also be mistaken for F. velutina H. & B. and F. goldmanii Standley. All of these species are in need of intensive study.

FICUS TURRIALBANA W. Burger, sp. nov.

Arbores ca. 20 m altae, internodiis foliiferis 2-28 mm longis, 4-12 mm crassis, puberulentis; stipulis acutis, 8-12 mm longis, dense sericeis. Folia modice grandia, petiolis 2-7 cm longis, ca. 3 mm crassis, puberulentis; laminis 12-24 cm longis, 6-12 cm latis, oblongo-ellipticis vel obovatis, apicibus brevissime acuminatis, pagina supra glabra vel minute-puberula, pagina inferna puberula cum anguste pilis 0.3-1 mm longis, nervis secundariis 9-12 utrinque. Recepticula geminata sessilia, oblata, 12-16 mm crassa, pagina ferruginea-sericea, ostiolo conico, ca. 3 mm lato, bracteis basilaribus manifeste, 6-8 mm longis. HOLOTYPUS: Burger 4004, in F (1705596), ISOTYPI: BM, CR, MEXU, MO, US.

Medium-size trees 15-20 m tall, leafy internodes 2-28 mm long, 4-12 mm thick, sparsely puberulent with slender white or brown hairs 0.3-1 mm long, periderm becoming pale gray and striate; stipules 8-12 mm long, 4-7 mm broad at the base unopened, densely ascending sericeous with brownish or whitish hairs but the hairs usually absent along the margins abaxially. Leaves not closely crowded, petioles 2-7 cm long, 1.8-4 mm thick, minutely puberulent, deeply striate on drying but not usually sulcate above; laminae 12-24 cm long, 6-12 cm broad, elliptic-oblong to somewhat obovate, tapering abruptly to the bluntly obtuse apex or sometimes with a very short acute tip, obtuse to sub-truncate at the base but often rounded at the petiole, margin entire or very shallowly indented distally, drying stiffly chartaceous to subcoriaceous with the margin slightly revolute, smooth and glabrous or very minutely (0.05 mm) puberulent above, densely to sparsely puberulent on the veins and veinlets beneath with slender straight hairs 0.1-0.9 mm long, the 9 to 12 pairs of major secondary veins usually flat above and prominent below, central secondaries arising at angles of 35-55 degrees, secondaries weakly loop-connected near the margin and a submarginal vein absent, tertiary veins often prominent beneath. Figs usually 2 at a node, sessile and often

leaving shelf-like impressions on the stems, basal bracts 2 but often deeply split and 2- to 5-lobed, 6-8 mm long (measured from the area of attachment), densely puberulent with brownish hairs to 1 mm long near the base, united with the receptacle for 1 or 2 mm around the base; figs 12-16 mm in diameter, (globose) oblate and about 1 cm high (dry), surface densely puberulent and often longitudinally 3- to 5-ribbed, ostiole conical and surrounded by a small ring of tissue 3-4 mm in diameter, external scales 2 or 3; seeds and galls 0.9-1.2 mm long.

Plants of the very wet Caribbean slopes and lowlands (premontane wet forest formations) around 700 m elevation in Costa Rica: Burger 4004, Ramirez s.n. (Museo Nacional 41515), and Leon 2463, all from near Turrialba, Cartago; fruiting collections have only been made in December.

Ficus turrialbana is distinguished by its blunt or shortly acute leaves puberulent beneath, prominent petioles, densely pubescent stipules with glabrous edges, thick stems with depressions formed by the sessile puberulent figs with large bracts and conspicuously umbonate ostiole surrounded by a thickened ring of tissue. This species can be mistaken for F. costaricana Standley (persistent stipules and glabrous leaves and figs), F. morazaniana Burger (pedunculate figs and small bracts), and F. velutina H. & B. (larger pedunculate figs and montane habitat). I have seen figs similar to the type in only F. tequendamae Dugand, a high-altitude species of Colombia. The species mentioned above are part of a complex of species that include F. trigonata L. and are well represented in northern South America and Central America.

Ficus turrialbana appears to be a wide ranging species of the Caribbean slopes of Central America and Mexico but fertile collections are rare. A collection from Vera Cruz, Mexico (Llewelyn Williams 8766) is conspecific and very similar to the type, both in its leaves and its figs. The figs of this species were described under Urostigma intramarginale by Liebmann (1851). However, the figs were associated with the leaves of Coussapoa panamensis Pittier and these discordant elements are a sufficient basis for rejecting Liebmann's name.

POUROUMA UMBELLIFERA W. Burger, sp. nov.

Arbores 10-25 m altae, internodiis foliiferis 2.5-15 mm crassis, dense vel parce sericeis; stipulis 5-15 cm longis, dense sericeis. Folia variabilia, petiolis 3-6 cm longis, 1.5-5 mm crassis, sulcis longitudinalibus; laminis (9) 12-28 (34) cm longis, (4) 6-16 cm latis, anguste ellipticis vel oblongo-ellipticis, apicibus acutis, basibus obtusis, pagina supra glabra praeter costam sericeam, pagina inferna nervis sericeis

et minute floccosa inter nervos, nervis secundariis (8) 14-22 utrinque. Inflorescentiae masculinae ignotae. Inflorescentiae femineae geminae, umbelliformae cum (3) 5-9 floribus, pedunculis (2) 4-8 cm longis; flores 6-8 mm longi, 3-4 mm crassi, anguste ellipsoidei vel ovoidei, velutini, stigmatibus peltatis, crassis undulatis. Inflorescentiae fructiferae pedicellis 1-3 cm longis, perianthium ad maturitatem fructus persistens, 15-20 mm longum, 10-15 mm crassum, ovoideum, fructibus glabris. HOLO-TYPUS: Roy Lent 2327, in F (1706528), ISOTYPI: BM, COL, CR, EAP, MO, NY, US, et alia.

Trees 10-25 m tall, leafy internodes 2-10 (30) cm long, 2.5-7 (15) mm thick, densely to sparsely puberulent with slender ascending hairs 0.5-2 mm long, periderm becoming wrinkled (dry); stipules 5-15 cm long, 4-14 mm thick, densely sericeous with lustrous pale silvery hairs about 1 mm long. Leaves often clustered near the ends of branchlets, quite variable in size (on the same tree), petioles 3-6 cm long, 1.5-4 (5) mm thick, longitudinally ridged, puberulent with mostly ascending appressed hairs about 1 mm long; laminae (9) 12-28 (34) cm long, (4) 6-16 cm broad, narrowly elliptic to elliptic-oblong, abruptly acute at the apex, obtuse or slightly rounded at the base, paired gland-like thickenings often present at the base of the blade above the petiole (adaxially), margin slightly rounded-undulate distally, lamina drying stiffly chartaceous to subcoriaceous, smooth above and puberulent only on the midvein, densely pale yellowish or whitish sericeous on the veins beneath, minutely whitish floccose between the veins, venation pinnate, the (8) 15 to 22 pairs of major secondary veins weakly loop-connected near the margin, central secondaries arising at angles of 30-50 degrees, tertiary veins slightly raised beneath. Male inflorescences and flowers unknown but probably similar to those of allied species (see below). Female inflorescences umbellate, peduncle (2) 4-8 cm long, about 2 mm thick, sparsely or densely puberulent, with 5 to 9 flowers per umbel, pedicels (2) 5-15 mm long (lengthening in fruit) very slightly expanded at the apex; female flowers 4-8 mm long, 1.5-3 mm thick, narrowly ellipsoid or ovoid, densely yellowish or grayish velutinous, stigma peltate, thick and undulate, densely and minutely reddish velutinous. Fruiting inflorescence with fruit borne on pedicels 1-3 cm long, about 1.5 mm thick, sparsely puberulent, the perianth-tube becoming 15-20 mm long, 10-15 mm thick, ovoid, abruptly narrowed at the base, gradually narrowed at the apex, sparsely puberulent with slender ascending hairs about 0.3 mm long, fruit only slightly smaller than the enclosing perianth, ovoid and somewhat flattened with suture-like lines on the flattened surfaces, glabrous and lustrous.

A species known only from the Caribbean coastal plain and adjacent slopes between 100 and 300 m elevation in Central Costa Rica. The type collection was made on January 21, 1972, with both female flowers and immature fruit near the Río Sarapiquí at Tirimbina, Heredia. Another collection (Burger & Burger 8137) of an immature tree 10 m tall without flowers or fruit and more elongate leaves in the same forest appears to be this species. Dr. Holdridge says that he has seen this species at La Selva on the Río Puerto Viejo, at La Virgen de Sarapiquí, and he has recently made a collection (6818, October 1972) with female flowers but without fruit above Siquerres, Limón.

Pourouma umbellifera is closely related to a group of plants of the Amazon basin placed under the following names (some of which are undoubtedly synonymous): P. cuatrecasatii Standl., P. isophlebia Standl., P. subplicata Standl., and P. umbellata Standl. Our species differs from these in having a greater number of female flowers per umbel, thinner fruiting pedicels with inconspicuous hairs, and female flowers less densely velutinous and with a more conspicuously peltate stigma. The male inflorescences of the Amazonian species are relatively small (5 cm) and compact, with shiny golden hairs on the peduncle and its branches. The pistillate umbel, which characterizes these species, has probably formed from the condensation of cymules.

TROPHIS INVOLUCRATA W. Burger, sp. nov.

Arbores parvae 3-5 m altae, ramis paucis, internodis foliiferis 5-35 mm long, 0.7-1.6 mm crassis, minute puberulentis; stipulis circa 2 mm longis, 1 mm latis prope basem. Folia petiolis 2-5 mm longis, circa 1 mm crassis, minute puberulentis; laminis 6-15 cm longis, 2-6 cm latis, oblongo-ellipticis vel parum obovatis, apicibus longiacuminatis, marginibus serratis, pagina supra glabra, pagina infera glabra vel puberulenta prope basem, nervis secundariis 6-10 utrinque. Inflorescentiae masculinae 1-4 cm longae, racemosae, pedunculis et rhachidibus minute puberulis, bracteis triangularibus circa 0.5 mm latis; flores pedicellis 1.2-2.3 mm longis, perianthis circa 2 mm longis, filamentis 2-3 mm longis. Inflorescentiae femineae 5-10 mm longae, spicatae vel ramosae, rhachidibus puberulis; flores sessiles, 3-4 mm alti, involucrati, perianthis similibus bractearum (?), stigmatibus circa 3 mm longis. Fructus ignoti. HOLOTYPUS: Opler 1657, in F (1721036), ISOTYPI: CR, MD, UC.

Small treelets 3-5 m tall, unisexual, leafy internodes 5-35 mm long, 0.7-1.6 mm thick, densely puberulent on new growth

with minute (0.1-0.2 mm) stiff erect hairs; stipules paired, about 2 mm long and 1 mm broad at the base, minutely puberulent, occasionally persisting, scars encircling less than half the stem. Leaves usually symmetrical, often few at the ends of slender twigs, petioles 2-5 mm long, about 1 mm thick, minutely puberulent; laminae 6-15 cm long, 2-6 cm broad, broadly elliptic-oblong to slightly obovate, abruptly narrowed at the long-acuminate apex, obtuse or slightly rounded at the base, margin bluntly serrulate with 2 to 4 teeth per cm, laminae drying chartaceous, smooth and glabrous above, minutely (0.1-0.2 mm) puberulent near the base or glabrous beneath, the midvein flat above, the 6 to 10 pairs of major secondary veins weakly loop-connected near the margin, microscopic globose-capitate hairs present on the lower surface and with clear round apically acute cells in the epidermis and epidermal cells with sinuate outlines (100X). Male inflorescences usually paired at a node, 1-3 (4) cm long, racemose, peduncle and rachis densely puberulent with minute (0.1 mm) erect hairs, rachis with triangular bracts about 0.5 mm long and basally attached; male flowers borne on pedicels 1-2.3 mm long and 0.2-0.4 mm thick, perianth-parts about 2 mm long, acute at the apex, sparsely and minutely puberulent, united near the base, filaments 2-3 mm long, anthers about 1 mm long (dry), a minute puberulent pistillode present. Female inflorescences usually paired in leaf axils but small (5-10 mm) and branched near the base (or on short-shoots?), the rachis densely puberulent with minute (0.1 mm) erect hairs, with spine-tipped bracts about 1.5 mm long subtending the inflorescence-branches, the rachis and bases of the flowers with smaller triangular basally-attached bracts 0.5-1 mm long; female flower about 3-4 mm high, the lower half or two-thirds enclosed within an involucre of small puberulent bracts in 2 or 3 series; perianth bract-like, 4-lobed, about 1 mm high, ovary 1.5-2 mm high (to the stigmas or style-branches), about 1 mm thick, minutely puberulent, stigmas about 3 mm long, arising from the apex of the ovary. Fruit not known.

Small trees in the dark understory of the tropical wet forest formation in the Caribbean lowlands of Costa Rica; collected in flower in mid-January, 1973. The species is known only from the La Selva field station of the Organization for Tropical Studies along the Río Puerto Viejo above the confluence with the Río Sarapiquí (Hartshorn 1091 & 1094 and Opler 1657).

Trophis involucrata is recognized by the relatively short leaves with abruptly acuminate apex and serrulate edges, small lateral stipules, short male racemes with pedicellate 4-parted flowers and stamens incurved in bud, and the very small axillary female inflorescences with few flowers subtended by an inconspicuous perianth and several series of imbricate bracts. The

slender minutely puberulent stigmas arising from the apex of the narrowed ovary are also distinctive.

The male flowers and inflorescences are very similar to those of *T. mexicana* (Liebm.) Bur. and *T. chiapensis* Brandeg. The female flowers and inflorescences, however, are very different from other neotropical representatives of *Trophis*. Because of the paucity of female material only one flower was dissected. The very thin perianth is similar to the imbricate bracts surrounding the base of the pistil and serial sections will have to be made before the nature of the "perianth" can be known. This thin perianth and the subtending bracts are very different from those seen in other species of the genus. The branched flowering axis, the spine-tipped bracts subtending the branches of the inflorescence, and the lack of a clearly distinguished style are also unusual among the New World species of the genus. Were it not for the male collections, the generic position of the female material would be questionable but there is no doubt in my mind that the male and female material is conspecific.

Acknowledgment

This work was supported in part by grants GB-3106, GB-7300, and GB-28446 from the National Science Foundation. These grants were especially important in supporting the field work and collecting necessary to provide a more complete treatment of the Moraceae for the new flora.

Literature Cited

- Corner, E. J. H. 1962. The classification of the Moraceae. Gard. Bull. Singapore 19:187-252.
- DeWolf, G. P., Jr. in R. E. Woodson & R. W. Schery 1960. *Ficus* in Flora of Panama. Ann. Missouri Bot. Gard. 47:146-165.
- DeWolf, G. P., Jr. 1969. A new species of *Ficus* from Suriname. Journ. Arn. Arb. 50:478-480.
- Gomez-Pompa, A. 1966. Estudios Botanicos en la region de Misantla, Veracruz. Inst. Mex. de Recursos Naturales Renovables. Mexico, D. F. 1-173.
- Liebmann, F. 1851. Mexico og Central-Americas neldeagtige Planter (Ordo: Urticaceae). Danske Vidensk. Selsk. Skrift. ser 5, 2:286-343.
- Standley, P. C. 1917. The Mexican and Central American species of *Ficus*. Contr. U.S. Nat. Herb. 20:1-35.